Appendix 13

Meadowbank MDRB Report No.28

March 18th, 2021

Mr. Alexandre Cauchon
General Manager
Agnico–Eagle Mines, Meadowbank Division
Baker Lake Office

Email: alexandre.cauchon@agnicoeagle.com

Dear Mr. Cauchon,

Report No 28
Meadowbank Dike Review Board (MDRB)
Conference calls November 24th and 25th, 2020

1.0 INTRODUCTION

A series of conference calls were convened by Agnico Eagle Mines (AEM) on November 24th and 25th with the MDRB to present and discuss the current status of the operations and construction at the Meadowbank Complex which includes Vault and Amaruq. The Board is currently comprised of three members, Mr. D. W. Hayley, Mr. Kevin Hawton and Mr. D. A. Rattue. All three members participated in the conference calls.

These calls constituted the 2020 annual meeting which was held on-line due to COVID-19 restrictions. A virtual site visit had been held on October 7th, 2020 to acquaint the Board with the status of operations and to ensure that material would be prepared for this November meeting to cover all pertinent subjects.

An information package was sent out ahead of time including four presentations P0, P3, P4 and P5. The P0 document included responses to the MDRB report of meeting No. 25. Digital copies of other material were provided subsequent to the sessions.

The subject matter is presented in this report in the same order as the conference call agenda. The recommendations are underlined in the text.

A draft report for meeting No. 28 was prepared by the MDRB and transmitted on December 8th, 2020. Responses from AEM were collated in a letter dated February 17th received on February 28th, 2021. The Board is content with these responses. The present final version of the Board's report contains elaboration on one of the recommendations of section 5.1, as per the request of AEM included in the February 17th communication.

2.0 OVERVIEW OF 2020 OPERATIONS

AEM described the 2020 work and results, with particular reference to the development of the Amaruq mine. Several challenges due to COVID-19, geology, and weather conditions were mentioned. Nevertheless, with the appropriate adaptations, a successful operation was conducted with good production.

The new underground potential was introduced. The expansion of open pit potential was also described.

3.0 MEADOWBANK TAILINGS AND WATER MANAGEMENT

The many theatres of activity, with Meadowbank, Vault and Amaruq, fully occupied the team over the past twelve months. Some incidents were reported but with no major impact on operations or dike safety.

The essential message was that there is adequate available tailings storage capacity for exploitation of the currently identified resource from all three mine sites. There has been no tailings deposition in the North or the South cell of the Tailings Storage Facility (TSF) in 2020. Only In-Pit deposition was carried out. However, some water ponding issues occurred within the TSF and wind-blown dust from the drying TSF surface needs a solution prior to final closure capping.

In-Pit deposition was to the Bay-Goose Pit until August 2020 when the operation was transferred to Pit E. Pit A currently serves as a settlement pond for the supernatant water transferred from the site of tailings deposition, but will also be included eventually as a tailings deposition site.

Tailings density for In-Pit deposition, as determined from bathymetric surveys in the Bay-Goose Pit is possibly higher than anticipated. This fact contributes to the position that overall volume availability will not be an issue.

More critical is the water management issue. The use of fresh water is greater than anticipated though abstraction rates are still within the quantity permitted by the licence. However, this leads to an increased total volume to be managed on site. No release to the environment is, as yet, possible. Treatment for release to the environment may eventually be required even before closure, but this may not be critical for anther two or three years.

There were some issues with winter operation of the transfer pumping system, but it is expected that this situation has been resolved for the 2020-2021 winter period.

4.0 OVERALL CLOSURE PLANNING

A high-level presentation was made of the closure planning. This included the schedule of studies and submissions. This constituted a good overview to set the context for the subsequent presentations.

5.0 CLOSURE UPDATE OF TAILINGS STORAGE AND WASTE ROCK STORAGE FACILITIES

5.1 Tailings Storage Facility (TSF)

Monitoring in the North Cell shows freezing around the outer edge but above-zero temperatures in the sector placed over talik. Continued thaw of encapsulated ice will likely lead to increasing irregularity in the surface topography of the tailings. A possible additional summer tailings deposition in the North Cell may be beneficial to adjust the topography prior to placement of the capping material. Capping design is apparently unchanged, with drainage orientation towards the location of the future spillway in the vicinity of Saddle Dam SD-3. The Board anticipates a review of the detailed design for closure in due course.

The In-Pit stored tailings will eventually be flooded to the natural elevation of Second Portage Lake and this will require placement of a blanket of material to preclude re-suspension of tailings during agitated lake conditions (wind, waves and wind set-up generated currents). A water depth of 8 m has been mentioned though it is not clear as to whether this is a regulatory requirement or a parameter derived from design studies. Dewatering, dry placement and re-flooding are envisaged for the blanket. This operation could present a significant challenge related to water treatment. The Board suggests that underwater placement be evaluated. The Board is of the opinion that a perfectly uniform blanket thickness is not essential to prevent re-suspension. Windrows of barge dumped material may suffice.

It is also suggested that additional testing be carried out to determine characteristics of the In-Pit tailings deposits. In addition to the bathymetric surveys, cone penetration testing (CPT) would provide data on the in-situ state. By way of elaboration, the following points are made:

- With CPT testing and, in particular, by the use of a piezocone, the stratification of the underwater deposited could be determined;
- This would also assist in the establishment of the anisotropy of transmissivity; and
- Give an indication of the bearing capacity for dumped fill or for the operation of equipment.

The testing could be carried out from the ice when a particular cell (Pit) is dormant. In the areas of deep water, an outer casing may be used to prevent rod bending.

The actual need for the testing will depend on the evolution of the tailings management and closure plan, and the requirement for input parameters to the studies being performed by the designer of the facility.

The Board enquires as to the status of the studies for long-term hydro-geological aspects. This subject was introduced at the meeting No. 22 by Dr. Morgenstern and, as AEM surmises, relates to the blanketing effect of the tailings and to the effect of consolidation of the same.

5.2 Meadowbank Waste Rock Storage Facility

Thermistors in Meadowbank WRSF are showing progressive freezing. However, a discrepancy is noted between the readings and the numerical modelling, possibly due to variable depths of snow accumulating on benches particularly on the northern slope. Extra instrumentation has or will be installed to provide more and better data for modelling. The data from drone based aerial topographic surveys has been interpreted so as to give, by differential elevation, the snow thickness. This application is another example of the innovative tools made possible by these devices. The numerical model predictions are indeed useful for design and behaviour forecasting

but reality is what counts and the design should either be conservative or be such that adjustments can be progressively made as the facilities are built and monitored, so as to achieve the performance objectives.

5.3 Amaruq Waste Rock Storage

The Whale Tail WRSF is also being monitored for temperature evolution within the waste rock mass. Some issues with instrument survival are noted. Conduits may be needed for all horizontal thermistor strings. Steel pipe is probably more robust than PVC. Snaking of direct burial cables was often included in the installation details for water storage dams, but is no longer seen as being adequate to provide extra resistance to tensile forces.

The available results from the working instruments indicate internal freezing. Good data is being obtained.

6.0 MEADOWBANK DEWATERING DIKE PERFORMANCE

6.1 Vault Dike

There are no issues to report for this structure which is nearing the end of the planned life.

6.2 South Camp Dike

Good performance is noted.

6.3 East Dike

Here too, no major issues have been reported.

Continued ingress of freezing is observed in the area downstream and this may be inhibiting drainage of ground water towards pits. This is manifested by a steady piezometer rise such as in 190P1. The condition is not deemed to be deleterious to performance.

This structure will be required until closure and a review of the instrumentation for long term monitoring will be made to ensure adequacy for the foreseeable future.

6.4 Bay-Goose Dike

No major issues are noted. A similar situation of progressive freezing leading to piezometer pressure rise has been observed.

This structure will also be required until closure and a review of the instrumentation for long term monitoring will be made to ensure adequacy for the foreseeable future. The non-functionality of some inclinometers is noted on the drawings provided however, given good deformation performance to date and the fact that no work is being performed downstream in the pit, the Board judges that replacement is not required.

7.0 TSF INSTRUMENTATION AND PERFORMANCE

7.1 North Cell structures.

Saddle Dam 1
Progressive freezing of the foundation and the dike is observed, and there are no issues with the performance of this structure.

Saddle Dam 2
Idem

Rockfill 1 and 2
Idem

North Cell Internal Structure
Local settlement has been observed, and there are minor erosion issues along the upstream toe of the structure. The cracking on the crests and slopes, as with the other phenomena could be due to ice-thaw induced settlement. Corrective measures and reprofiling of the tailings may be required prior to capping. Otherwise, the structure is performing well.

Stormwater Dike
There are no issues with dike performance. A strong downward gradient is still observed in tailings and foundation near the dike toe. As previously noted, a hydraulic connection through bedrock (talik) to the pond downstream of Central Dike is postulated. The presence of a water pond in the South Cell encourages a warming trend in the area of instrument SW-03. It should be noted that the surface of the South Cell was generated by strategic tailings deposition such that drainage is towards the area of Saddle Dam 3.

7.2 South Cell structures.

Central Dike
An incident related to pumping from the downstream pond creating ice buildup in the crest area was described. This was addressed by diverting the pump discharge to pits E and A. No damage was noted on the liner following spring thaw.

Seepage remains at easily managed flow rates with a base flow (winter) of around 45 m^3/hr. The orange colour returned to the pond as in previous years. The question to be posed is whether the microbial reduction of iron could occur in shallow water after closure and back flooding of either this area or the tailings deposits in the mined-out Meadowbank Pits.

Continuing slow cooling of the dike and foundation is reported and some pore pressure increase is noted despite the blanket of tailings over much of the exposed fractured bedrock in the south cell area. Pressure rise is likely related to seepage path constrictions related to freezing ingress. The replacement of some instruments was carried out in 2020. Overall performance of the dike is satisfactory.

Saddle Dam 3
This structure is performing as intended. Further cooling of the foundation is noted. The dike or, at least the general vicinity, will be the site of future spillway from the TSF.

Saddle Dam 4
No issues are reported and the saddle dam is performing as intended.

Saddle Dam 5
Shallow ponding has been observed at the upstream toe but the foundation and fill remain frozen.

8.0 WHALE TAIL PROJECT 2019-2020 CONSTRUCTION SUMMARY

There were four areas of activity in the period as described below.

8.1 Whale Tail Dike

Site investigation for the design of the Whale Tail Dike had revealed the presence of permafrost, not only on the abutments but also in the lakebed beneath the shallow water of the eastern side of the lake. Bedrock grouting in these areas was thus not attempted during the main construction. Subsequent thawing of the foundation during the initial year of operation led to the decision to resume grouting as a means of reducing the seepage. The remedial grouting programme was carried out between November 2019 and March 2020 when activities were suspended as a result of COVID-19 restrictions. As expected, the highest grout takes were recorded in areas not grouted during the initial construction. i.e., in areas previously frozen. The Board considers that the programme was well managed with a successful outcome as far as it concerns the overall objective of reducing seepage by at least 40% as was documented during the freshet of 2020.

8.2 WRSF Dike

Under-seepage related to foundation thaw was detected in 2019. Remedial works to enhance the upstream thermal protection as well as new operating procedures to lower the level of ponded water were adopted. The works, as previously discussed with the Board, were carried out in the early spring period of 2020 in order to maintain frozen foundation conditions. Instrument readings indicate satisfactory performance to date; however the structure will not be subjected to conditions that will confirm this until the 2021 freshet.

8.3 South Whale Tail Channel

From the description provided, the Board noted well planned and executed work. Good control over quality was exerted. Of particular importance was the liaison maintained with the Designer whether they were on or off site. The observational approach was used with adjustment of design details to account for foundation conditions as encountered. The first major test will be freshet 2021.

8.4 IVR Diversion Channel

This component constituted another example of well executed work with field-fit adaptations to conditions. The comment above related to having maintained a good liaison with the designer is equally applicable. Some inaccessible ground ice remains below the channel invert and observation will be required to detect any further thaw leading to possible remedial work to channel.

9.0 WHALE TAIL DIKE PERFORMANCE

AEM made a comprehensive presentation covering the pumping system, weirs, thermistors, inclinometers and piezometers. Seepage reporting to the downstream toe drainage ditches is captured efficiently and discharged to either the attenuation pond or to South Whale Tail Lake according to water quality. Inevitably given the pervious nature of the overburden and of the bedrock, some seepage bypasses the collection system and drains directly to the attenuation pond located in what was the Northern part of Whale Tail Lake. The four pump stations are connected to a single header pipe thus precluding any segregation of seepage flow, according to water quality, that could otherwise permit part of the flow to be pumped to South Whale Tail and part to the attenuation pond. Apparently, the water quality is relatively uniform and such an exercise has not been required to date.

Instrument data indicates adequate control over seepage flow rates but, not surprisingly, an effect of the seepage on thermistor and piezometer readings is also apparent. The thermistor data points to a continuation of permafrost degradation on the abutments and in the eastern side of lakebed which is accompanied by deformation as manifested by cracking and inclinometer measurements. However, no increase of seepage flows has been noted.

The interpretation of temperature readings could benefit from interrogation of the actual installation location in relation to features of the foundation topography, embankment zone, or cut-off as the case may be. Taken on face value, some temperature changes could be interpreted as indicating a defect in the cut-off wall permitting flow from the upstream to downstream. The temperature measurements taken at the location of the inclinometer INC-3 (SAA) at Stn. 0+560 are a case in point. The graph included in Attachment C compares the evolution of temperature at around elevation 153 m to readings taken in thermistor strings in the upstream embankment fill at Stns. 0+276 and 0+710. The instrument at 0+276 is taken as representing lake water temperature. There is a time lag for Stn. 0+560 and also a temperature differential. This indicates that significant seepage at that location is unlikely. Thermistors in the downstream embankment fill at 0+530 and 0+580 remain at around 0°C at a similar elevation and at the same time of year. The deformation recorded by SAA-560 (INC-3) is 20 mm over a height of 5 m, with a uniform profile and no sign of dislocation. Crushing or shearing of the cut-off is therefore also unlikely. Indeed, AEM has concluded that no significant seepage through the cut-off is occurring. Information relating the exact location of the instrument (Stn. and offset) compared to the cement-bentonite column locations may be informative.

Warming temperatures are noted at both abutments, leading the Board to reiterate a previous recommendation that backfill be placed in the depression on the upstream side and adjacent to the east abutment and to an elevation greater than the anticipated maximum lake level. This would increase the surface area exposed to cooling during the winter and reduce the penetration of warm lake water during the summer, thus enhancing freeze-back of the foundation. The possibility of further degradation of the permafrost in the abutments beyond or beneath the grout curtain cannot be totally excluded. The potential for a similar exercise at the west abutment should be evaluated also. Ideally, the material should be well graded medium to coarse sandy gravel that is placed in lifts and compacted. It should be built to an elevation about 0.5 m minimum above a reasonable maximum flood (say 50-100 yr. return period). Given that seepage flows are currently manageable, the Board understands that AEM is monitoring the behaviour and, if seepage quantities increase, this potential intervention may be re-evaluated.

There was also some discussion on the potential use of thermosyphons in such conditions. Indeed, there is precedence for their use on northern project sites but the installation and initial ground freezing is best carried out before a hydraulic gradient is created by de-watering.

10.0 PERFORMANCE OF OTHER AMARUQ WATER MANAGEMENT STRUCTURES

10.1 WRSF Dike

Satisfactory performance is indicated by the monitoring, though the structure has not yet been tested under freshet conditions. The upstream water elevation will be more tightly controlled in the future.

10.2 North East Dike

This dike also exhibited good performance. However, the dike has now been removed to initiate IVR Pit pre-stripping.

10.3 Mammoth Dike

Good performance has been shown for this dike. However, there was an encroachment on the freeboard when the rate of pumped inflow to the Mammoth Lake exceeded the outlet capacity until such time as the ice jam broke up. In future, the level of Mammoth Lake will be lowered in anticipation of winter conditions and freshet.

10.4 South Whale Tail Channel

In general, the diversion channel has performed as expected. Removal of residual construction materials was required at the inlet to optimise flow. Sloughing of the rip-rap was noted at Stn. 0+70 as well as some slope settlement at Stn. 0+850. These areas will be remedied as required; however the cause should be investigated so as to determine if a repetition in other sectors should be anticipated or if indeed the phenomenon was local. Permafrost degradation could be a possible explanation.

10.5 Saline Ditch

Local settlement and cracking along the sides were noted, however this does not appear to be a major issue. Repairs will be carried out and monitoring is to continue.

10.6 Attenuation Pond Ramp

No adverse conditions.

11.0 RESPONSES TO MEETING No. 25

AEM provided responses to the report of meeting No. 25. While no discussion was held during the conference calls, the Board has reviewed the responses and finds the various points to have been adequately addressed.

12.0 NEXT MEETINGS

The Board hopes that the next annual meeting covering the performance of the structures of the Meadowbank Complex will be held on-site in early September 2021 but expects that any other participation will be through further ad-hoc conference calls. The Board awaits instruction from AEM in this regard.

13.0 ACKNOWLEDGMENTS

The Board wishes to thank the personnel of AEM for the preparation of material and the participation of AEM, SLI and GAL in the conference calls.

Signed:

Don W. Hayley, P. Eng

Kevin Hawton, P. Eng

D. Anthony Rattue, P. Eng.

ATTACHMENT A

AGENDA FOR BOARD MEETING NO. 28

November 24th and 25th, 2020

Agnico Eagle Mines - Meadowbank Division
Meadowbank Dike Review Board
Meeting # 28 - November 24 to 25, 2020
Meeting Location : Virtual
AGENDA

DAY 1 - Tuesday November 24	Time allocated	Start (EST)	End (EST)
P0 - Welcome, Management Update [AEM]	0:30	10:00	10:30
P1 - Meadowbank Tailings & Water Management - Operations [AEM]	1:00	10:30	11:30
P2 - Closure Update TSF/WRSF [AEM]	1:00	11:30	12:30
Lunch Break	1:00	12:30	13:30
P3-P4-P5 Q&A Session - Dewatering Dike and Tailings Management Performance [AEM]	1:00	13:30	14:30
P6 - Summary of Whale Tail Project 2019-2020 Construction Season (SWTC, WRSF Remediation, IVR Diversion, WTD Grouting) [AEM]	2:00	14:30	16:30
DAY 2 - Wednesday November 25			
P7 - Whale Tail Dike Performance [AEM]	1:00	10:00	11:00
P8 - Performance of WT Project Water Management Infra (WRSF Dike, Mammoth Dike, NE Dike, SWTC, Saline Ditch, Attenuation Pond Ramp) [AEM]	1:30	11:00	12:30
Lunch Break	1:00	12:30	13:30
Deliberation by the Board Members	2:00	13:30	15:30
Preliminary Report by the Board Members	1:00	15:30	16:30

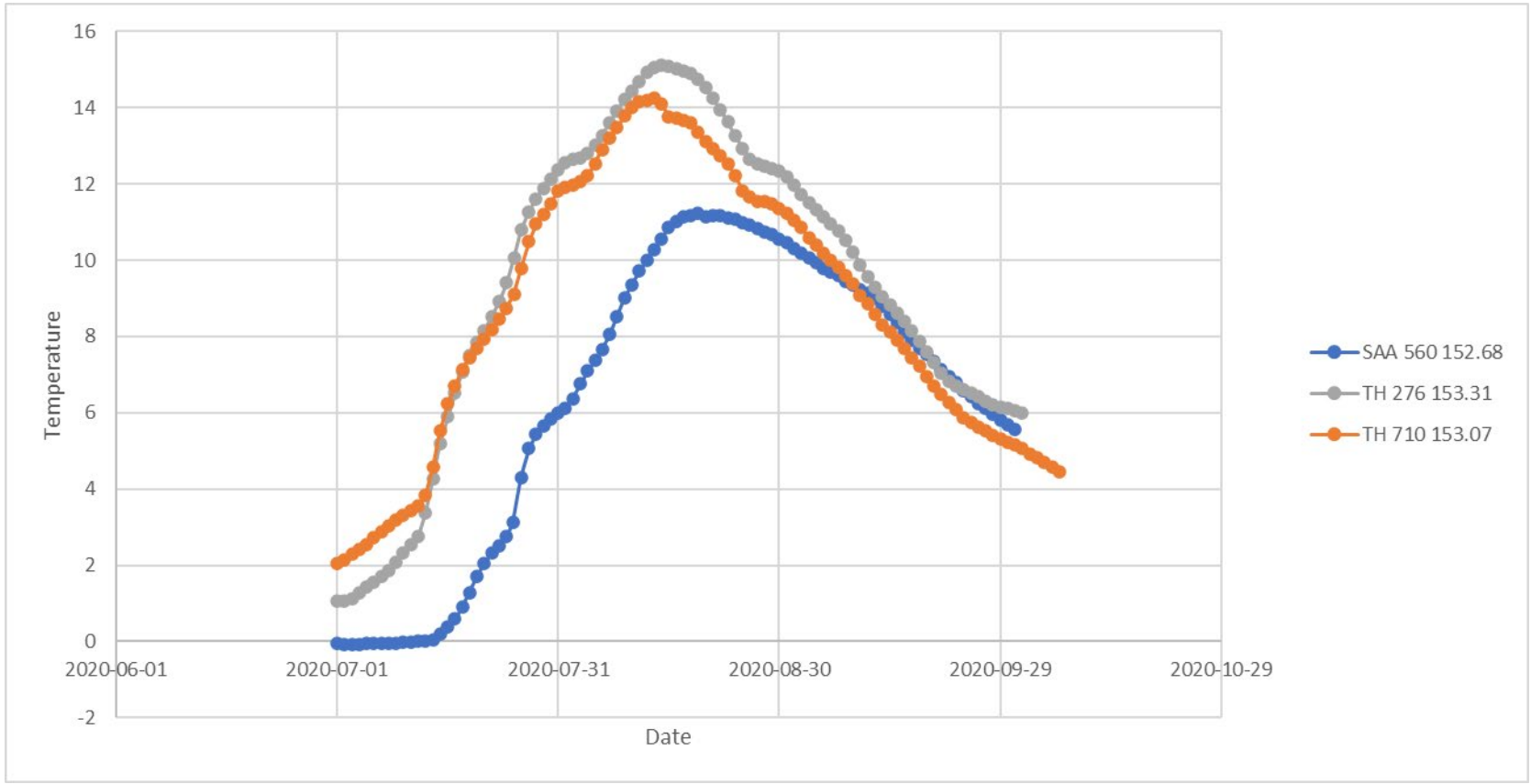
ATTACHMENT B

ATTENDANCE AT NOVEMBER 2020 CONFERENCE CALL MEETING

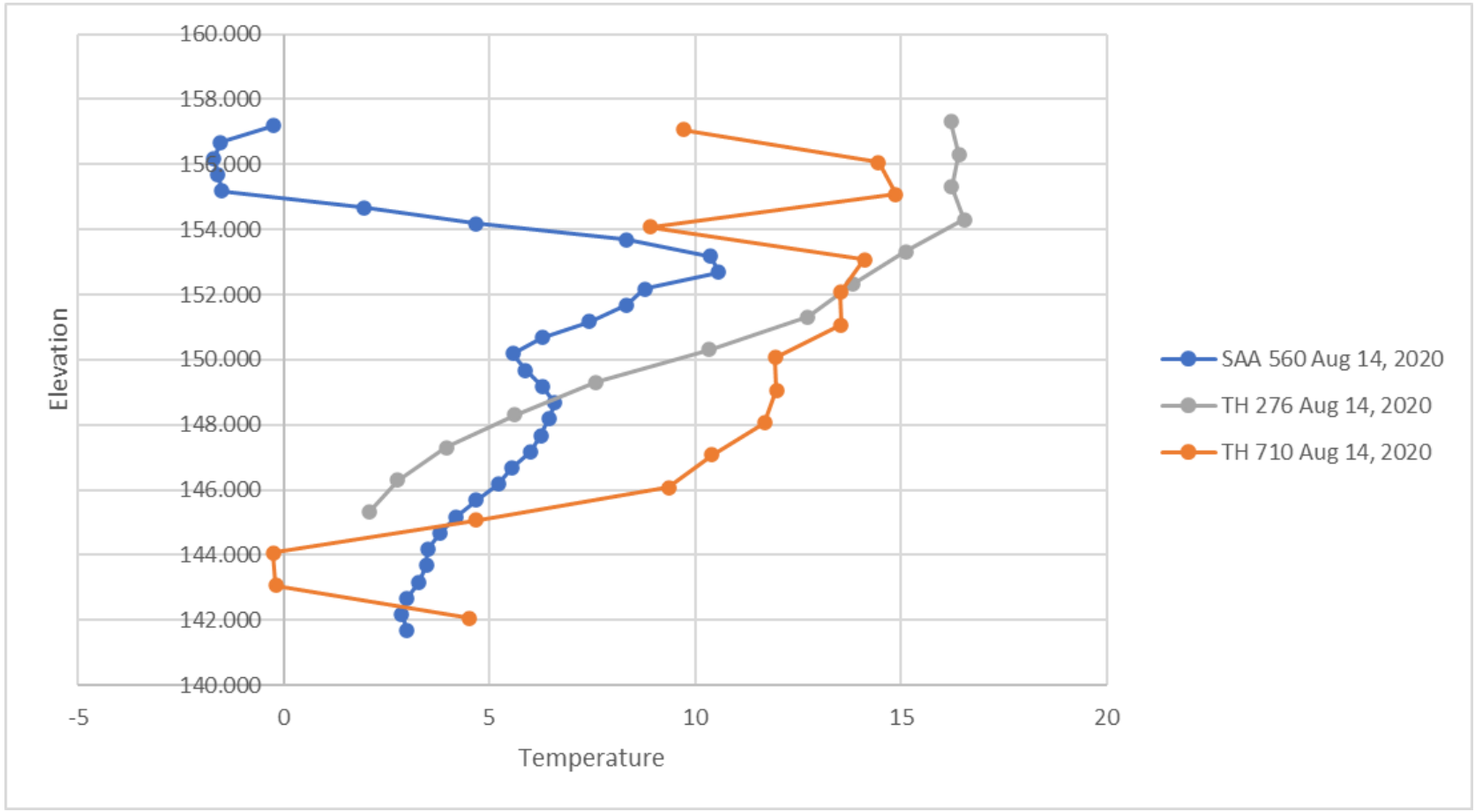
Attendance		
Fredérick L. Bolduc	AEM	Geotechnical Coordinator
Vincent Breault	AEM	
Nicole Brisson	AEM	
Alexandre Cauchon	AEM	Mine Manager
Laurier Collette	AEM	
Yan Coté	AEM	Engineering Superintendant
Patrice Gagnon	AEM	
Michel Julien	AEM	VP Environment
Alexandre Lavallée	AEM	Geotechnical Coordinator
Pascal Lavoie		
Thomas Lepine	AEM	EoR – Technical Specialist, Env. Management
Christian Tremblay	AEM	
Yves Boulianne	GAL	Geotechnical Engineer
Marion Habersetzer	GAL	
Anh-Long Nguyen	SLI	Project Manager
Nina Quan	SLI	Geotechnical Engineer
Don Hayley		Dike Review Board
Kevin Hawton		Dike Review Board
Anthony Rattue		Dike Review Board

ATTACHMENT C

Graph illustrating a comparison of temperatures in Whale Tail Dike



Comparison of temperatures at El. 153 Whale Tail Dike



Comparison of vertical temperature profiles at three locations on the upstream side of Whale Tail dike

AGNICO EAGLE

To: D. Anthony Rattue, Don W. Hayley, and K. Hawton

From: Agnico Eagle Mines, Meadowbank, Nunavut Division

Date: February 17, 2020

RESPONSE TO COMMENTS, MEADOWBANK DIKE REVIEW BOARD No.28 – MEADOWBANK REPORT

The twenty-eighth meeting between the Meadowbank Dike Review Board (the Board) and Agnico Eagle Mines Limited (AEM) was held on November 24th and 25th, 2020 through a conference call.

The objective of the meeting was present and discuss the current status of the operations and construction at the Meadowbank Complex which includes Vault and Amaruq, as is conducted yearly.

On December 8th, 2020, the Board provided their report (MDRB Meeting No 28 Report) with their recommendations. This letter provides the response from AEM related to the Board recommendations for the report. All Board recommendations are contained in the following table along with their location, action plan, current status, and anticipated completion date. This table will be used to follow up on each recommendation throughout the upcoming year and to update the Board when the next MDRB Meeting is held.

Best Regards,

Frédérick L.Bolduc M.Sc.A, P.Eng.
Geotechnical Coordinator & Responsible Person
Meadowbank Complex, Nunavut Division, Agnico Eagle Mines

MDRB28 Recommendations and Action Plan

AGNICO EAGLE

Location/Structu	Report	MDRB Recommendation/Comments	AEM Answer	Status	Completion Date
In-Pit stored tailings (all pits)	MDRB #28	Dewatering, dry placement and re-flooding are envisaged for the blanket. This operation could present a significant challenge related to water treatment. The Board suggests that underwater placement be evaluated. The Board is of the opinion that a perfectly uniform blanket thickness is not essential to prevent re-suspension. Windrows of barge dumped material may suffice.	AEM agree that the placement of a uniform blanket of material over the tailings will be a challenging operation and the feasibility and requirement of this item will be re-evaluated in the framework of the review of the closure plan. The underwater placement of material will be evaluated as a potential alternative during this exercice.	Open	-
In-Pit stored tailings (all pits)	MDRB #28	It is also suggested that additional testing be carried out to determine tailings characteristics. In addition to the bathymetric surveys, cone penetration testing would provide data on the in-situ state.	As the in-pit deposition is done sub-aqueously with a significant water cover it is not currently feasible to perform a CPT campaign. AEM would like to request additional information from the Board on what the purpose of this campaign would be.	Open	-
In-Pit stored tailings (all pits)	MDRB #28	The Board enquires as to the status of the studies for long-term hydro-geological aspects. This subject was introduced at the meeting No. 22.	AEM understanding is that this is referring to N. Morgernstern's comment that the hydrogeolocial study was too conservative and did not take into consideration the blanketing effect of the tailings deposition. AEM acknowledge the comment and is currently evaluating what is the best course of action for this update.		
MBK RSF	MDRB #28	A discrepancy is noted between the readings and the numerical modelling possibly due to variable depths of snow accumulating on benches particularly on the northern slope.The numerical model predictions are indeed useful for design and behaviour forecasting but reality is what counts and the design should either be conservative or such that adjustments can be progressively made as the facilities are built and monitored, so as to achieve the performance objectives.	In 2019 O'Kane performed a review of the thermal model prediction to the data measured in the field. The conclusion from this review was that a decreasing trends in the active zone depths are being recorded at most thermistor locations. The conlcusion of this study is that the overall trend in the observed data was becoming more consistent with the results of the numerical model with time and that the confidence of the numerical model as a predictor of future conditions was moderate to high and that the trend toward consistency will continue. Following this report further thermistors were installed as per O'Kane recomendation. AEM will install in 2022 a near surface monitoring system at the MDBK WRSF and will continue to monitor the data to ensure a good concordance between the model and the measured data. If required, change will be made to the facility to ensure that the performance objective are met.	Open	-
AMQ WT WRSF	MDRB #28	Conduits may be needed for all horizontal thermistor strings. Steel pipe is probably more robust than PVC. Snaking of direct burial cables was often included in the installation details for water storage dams, but is no longer seen as being adequate to provide extra resistance to tensile forces.	PVC casing will be used for the next installation of instruments where cables will be buried. PVC casing was choosen for logistic reason (widely available on site and ease of installation). If this method proves not robust enough, metal casing could be used in future installation to improve cable protection	Open	-
MBK Central Dike	MDRB #28	The orange colour returned to the DS pond as in previous years. The question to be posed is whether the microbial reduction of iron could occur in shallow water after closure and back flooding of either this area or the tailings deposits in the mined-out Meadowbank Pits.	No breaching of retaining dike will be done until water quality meets environmental criteria to allow this operation. The microbial reduction of iron reaction is not expected to occur once flooding of the area completed. Monitoring will be performed during the closure period before the breaching. This aspect will be studied in furter details in the update of the detailed engineering closure plan of the TSF.	Open	-
AMQ Whale Tail Dike	MDRB #28	The interpretation of temperature readings could benefit from interrogation of the actual installation location in relation to features of the foundation topography, embankment zone or cutoff as the case may be. Taken on face value, some temperature changes could be interpreted as indicating a defect in the cut-off wall permitting flow from the upstream to downstream. The temperature measurements taken at the location of the inclinometer INC-3 (SAA) at Stn. 0+560 are a case in point. The graph included in Attachment C compares the evolution of temperature at around elevation 153 m to readings taken in thermistor strings in the upstream embankment fill at Stns. 0+276 and 0+710. The instrument at 0+276 is taken as representing lake water temperature. There is a time lag for Stn. 0+560 and a temperature differential. This indicates that significant seepage at that location is unlikely. Thermistors in the downstream embankment fill at 0+530 and 0+580 remain at around 0°C at a similar elevation and at the same time of year. The deformation recorded by SAA-560 (INC-3) is 20 mm over a height of 5 m, with a uniform profile and no sign of dislocation. Crushing or shearing of the cut-off is therefore also unlikely. Indeed, AEM has concluded that no significant seepage is occurring. Information relating the exact location of the instrument (Stn. and offset) compared to the cement-bentonite column locations may be informative.	This reasoning is systematically applied by the AEM team during routine review and interpretation of the instrumentation data. AEM will ensure that this information is also included in quarterly reports and MDRB communications. This method of comparing instrument location with data trends has allowed AEM to confirm that the thermal signature observed at 0+560 was not related to water ingress into the wall, given the time lag between thermal variations in the lake and this particular location in the wall.	Open	-
AMQ Whale Tail Dike	MDRB #28	Warming temperatures are noted at both abutments, leading the Board to reiterate a previous recommendation that backfill be placed in the depression on the upstream side and adjacent to the east abutment and to an elevation greater than the anticipated maximum lake level. This would increase the surface area exposed to cooling during the winter and reduce the penetration of warm lake water during the summer, thus enhancing freeze-back of the foundation. The possibility of further degradation of the permafrost in the abutments beyond or beneath the grout curtain cannot be totally excluded. The potential for a similar exercise at the west abutment should be evaluated also. Ideally, the material should be well graded medium to coarse sandy gravel that is placed in lifts and compacted. It should be built to an elevation about 0.5 m minimum above a reasonable maximum flood (say 50-100 yr. return period).	Backfilling in the vicinity of the East abutment would be logistically challening due to the presence of the diffusers and associated piping in this area. Backfilling of the abutments was previously identified as a possibe mitigation measure to reduce seepage through the dike but it was put on hold to be re-assessed after the completion of the remedial grouting campaign. Following this campaign, the current seepage rate is now stable and managable with the infrastructure present on site and it was decided to not pursue this mitigation technique. If the thermal degradation of the abutment would cause seepage rate to increase, the backfilling option would be considered again.		
AMQ South Whale Tail Channel	MDRB #28	Sloughing of the rip-rap was noted at Stn. 0+70 as well as some slope settlement at Stn. 0+850. These areas will be remedied as required, however the cause should be investigated so as to determine if a repetition in other sectors should be anticipated or if indeed the phenomenon was local. Permafrost degradation could be a possible explanation.	The observed sloughing of riprap at 0+070 has been identified as local damage only and does not suggest a global behaviour at the scale of the South Whale Tail Channel. This type of minor deformation can be expected because of the winter construction, surficial thawing of previously frozen soil and inevitable snow/ice entrapment in the granular material during installation. Care was taken during construction to avoid large frozen chunks in the material that could cause larger deformations after thawing. AEM will repair the damaged areas and monitor the structure for further movement. As the cause is reasonably certain and the South Whale Tail Channel is performing well, AEM believes that no further action is required for now.	Open	-